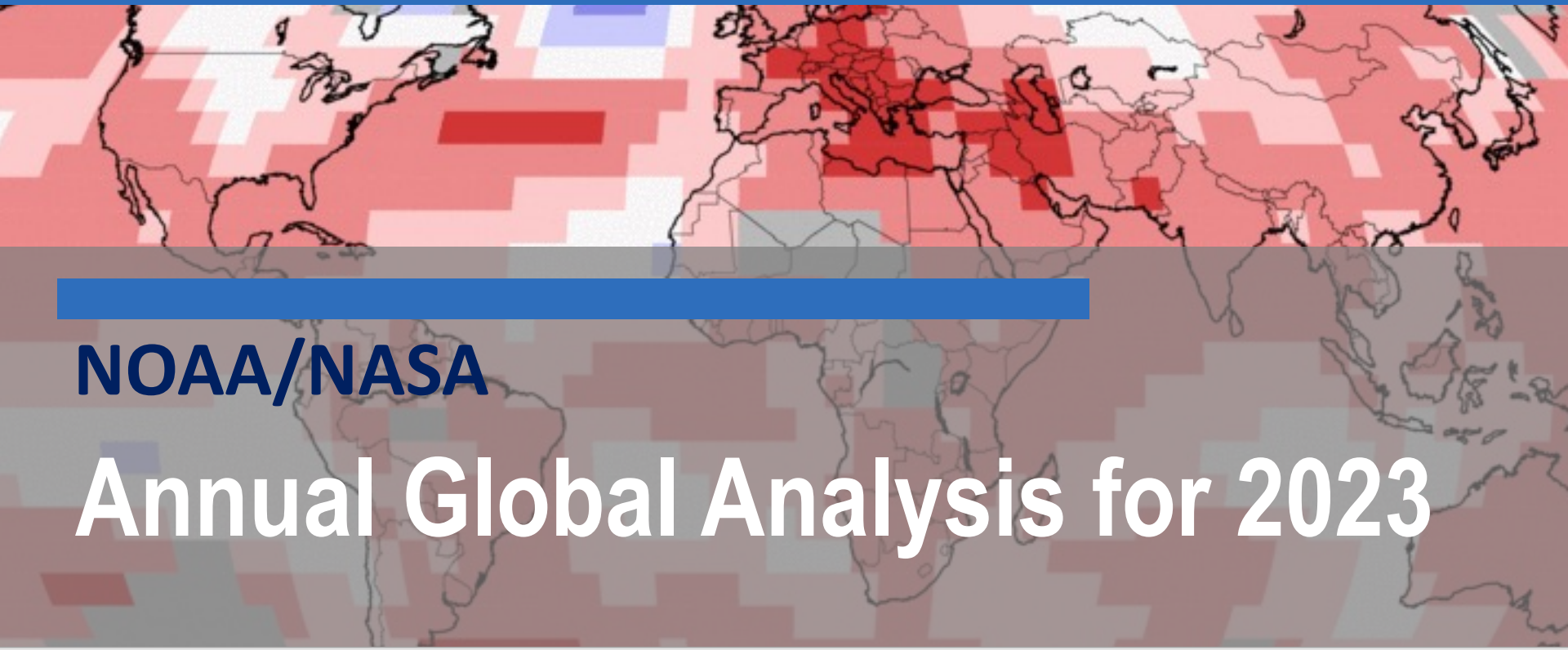

NOAA/NASA

Annual Global Analysis for 2023

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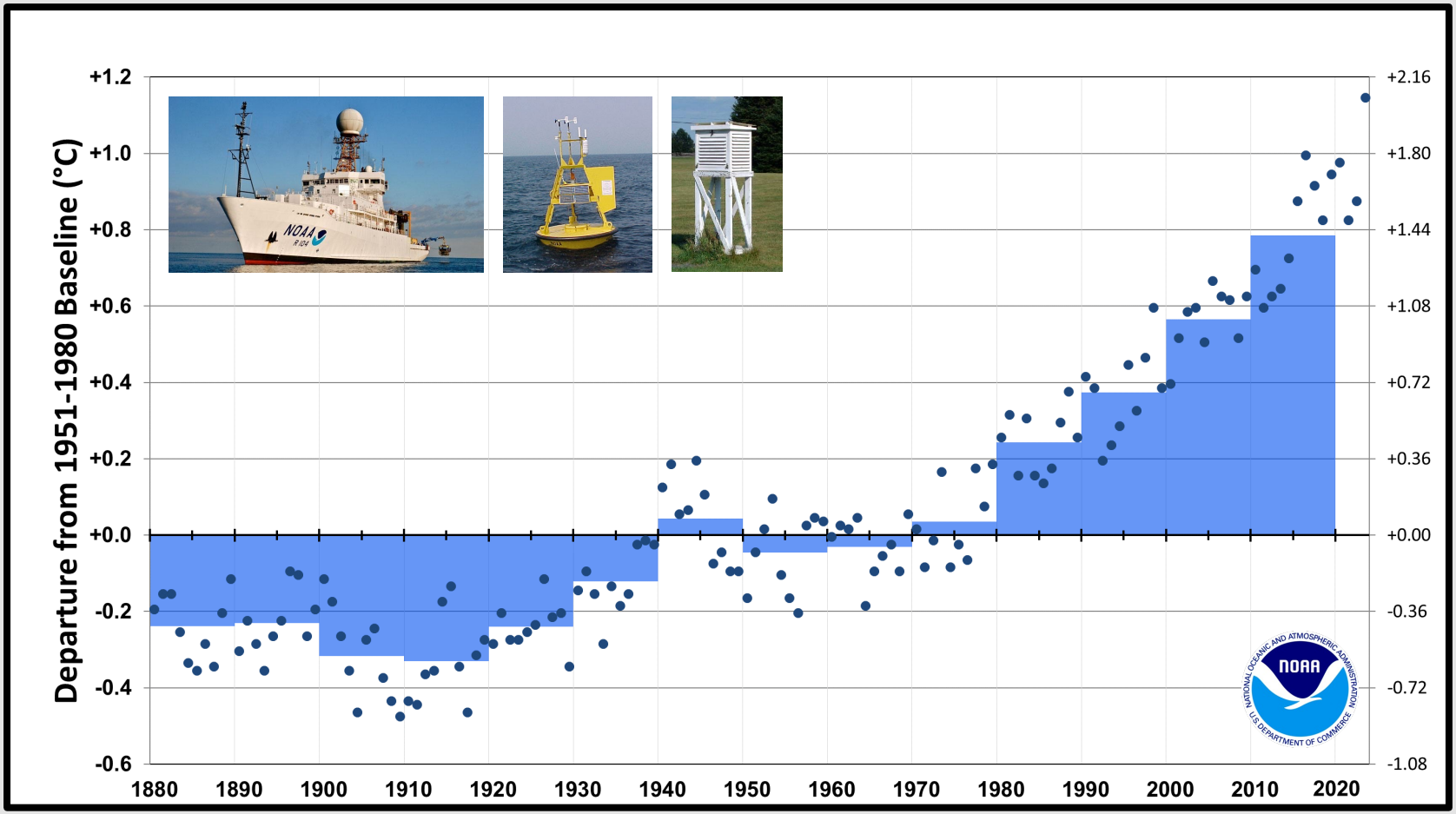
January 2024

NOAA: 2023 Ranked Warmest

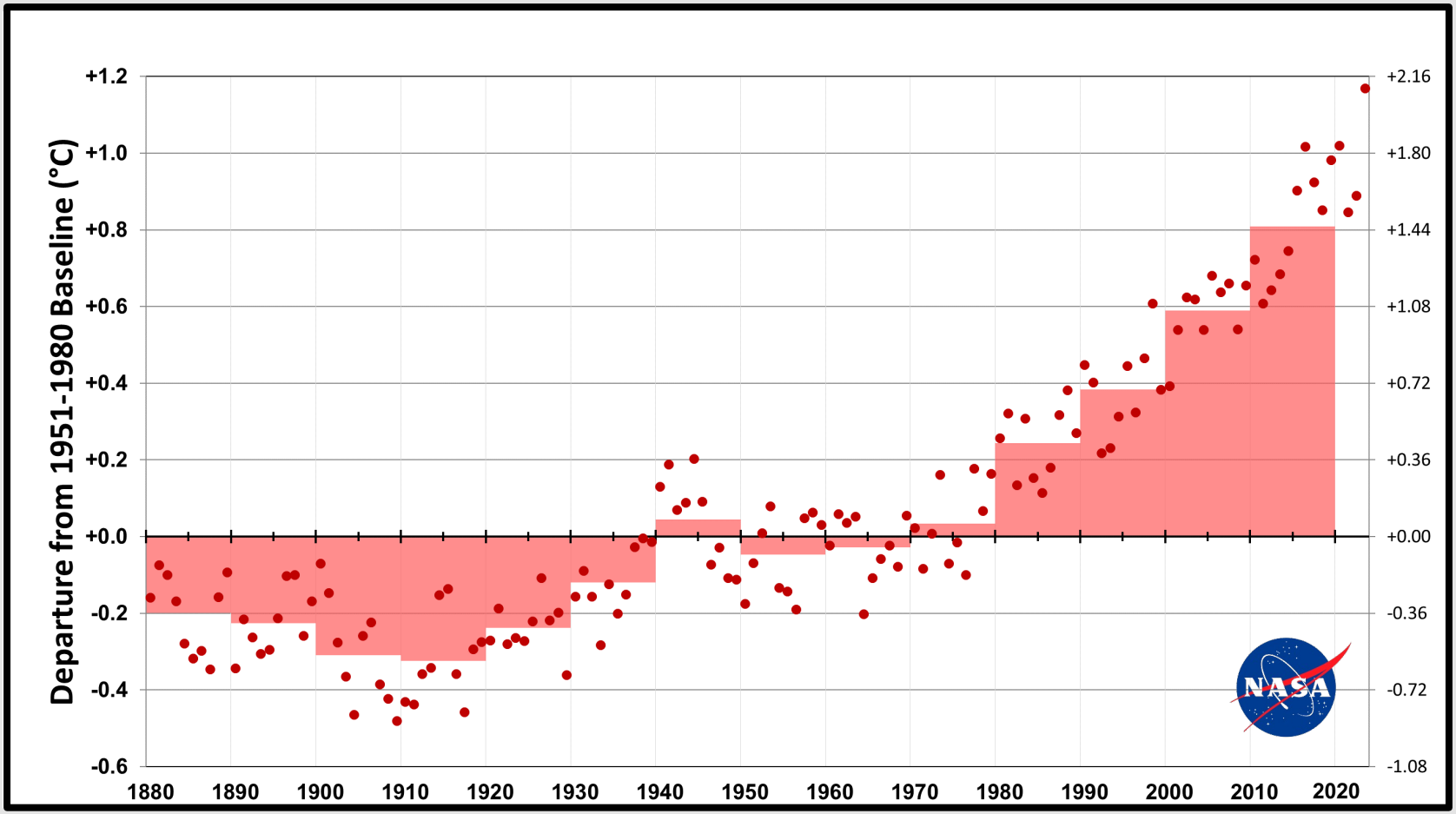
1.18ºC (2.12ºF) above 1901-2000 baseline*, 0.15ºC warmer than 2016



*NOAA uses 1901-2000 as the baseline in its monthly reports.
For reference purposes, 2023 was 1.14°C (2.05°F) above the 1951-1980 baseline.

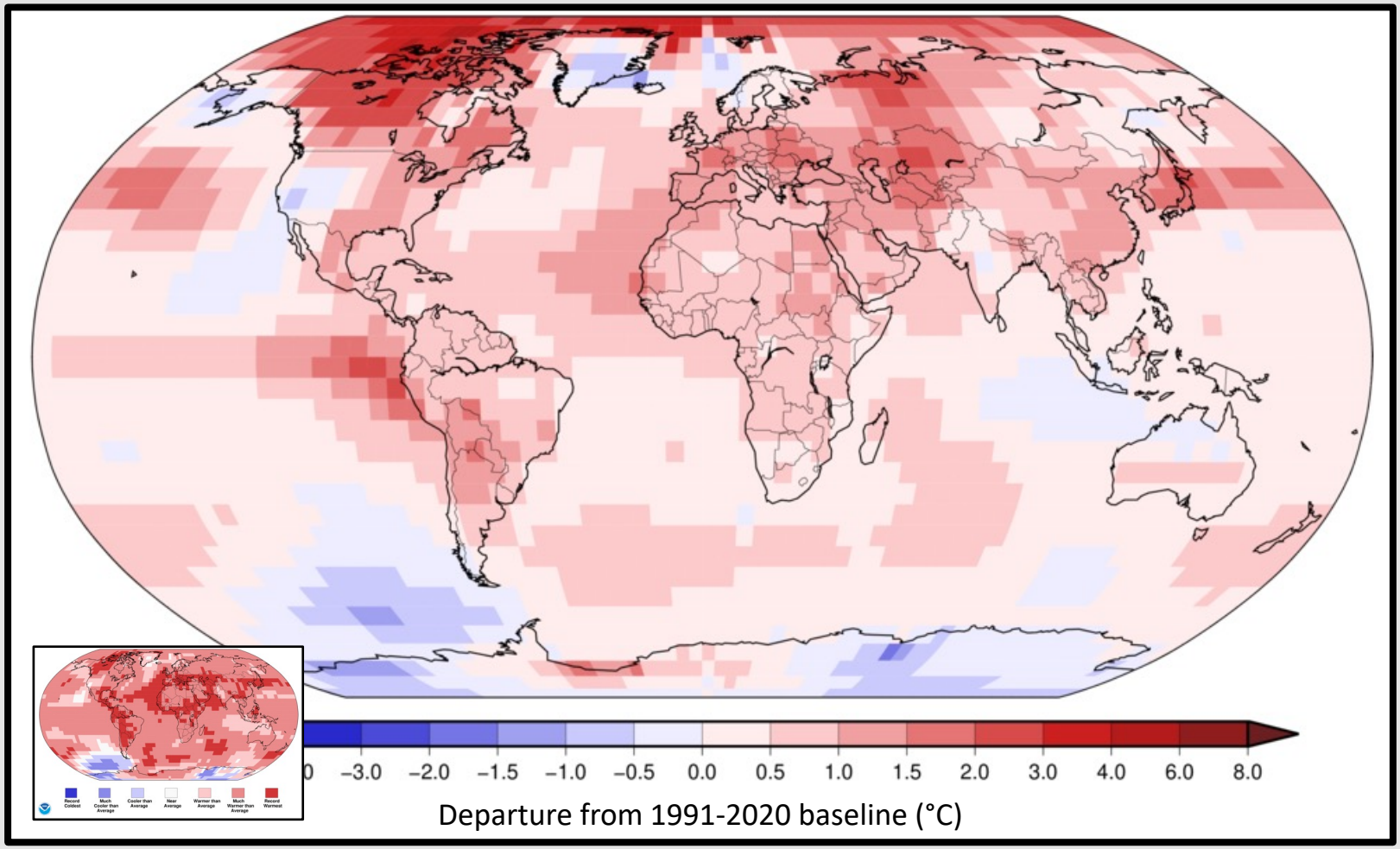
NASA: 2023 Ranked Warmest

1.17ºC (2.11ºF) above 1951-1980 baseline, 0.16ºC warmer than 2016



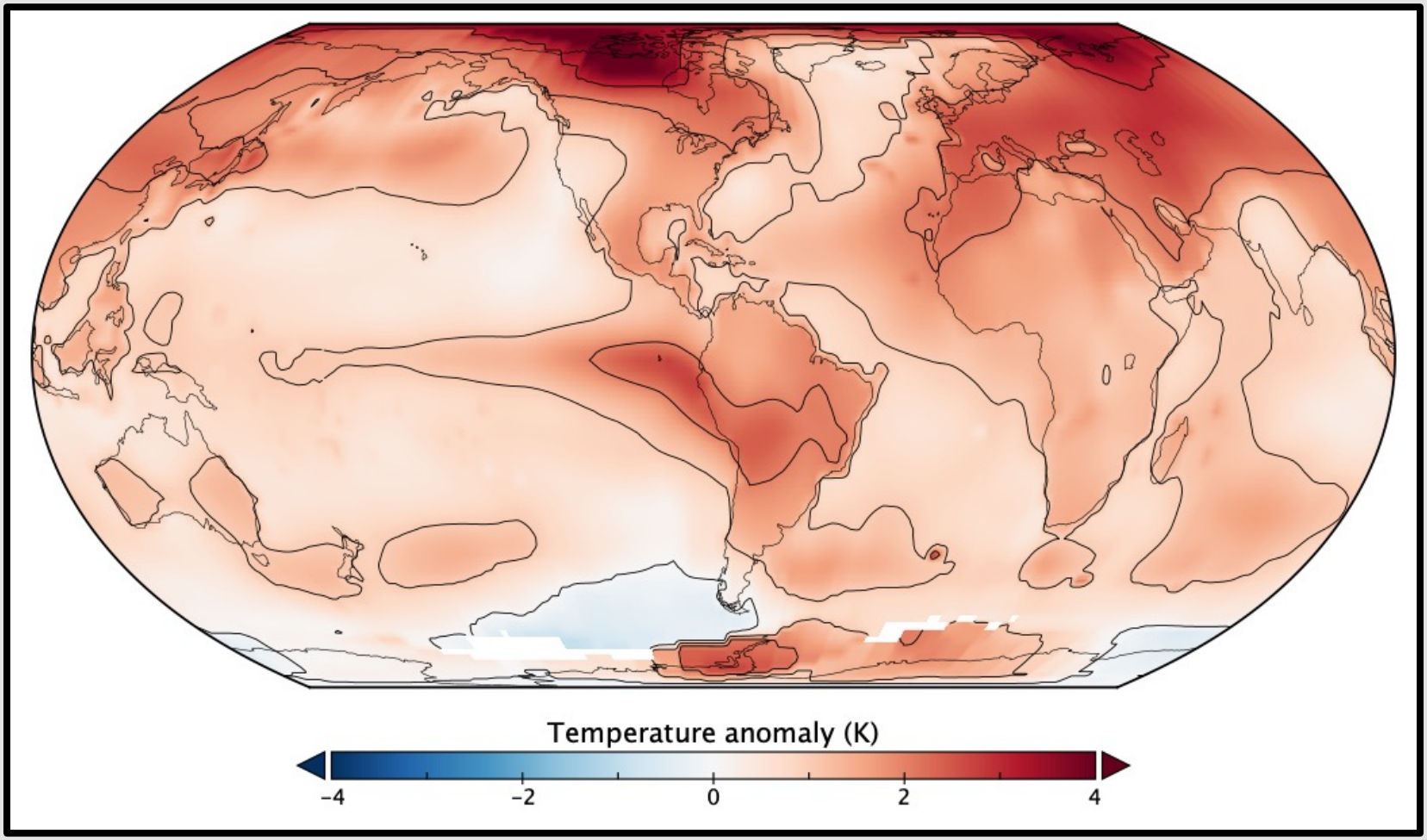
NOAA: Warm over Most of the Globe

El Niño and other factors contributed to higher global temperatures



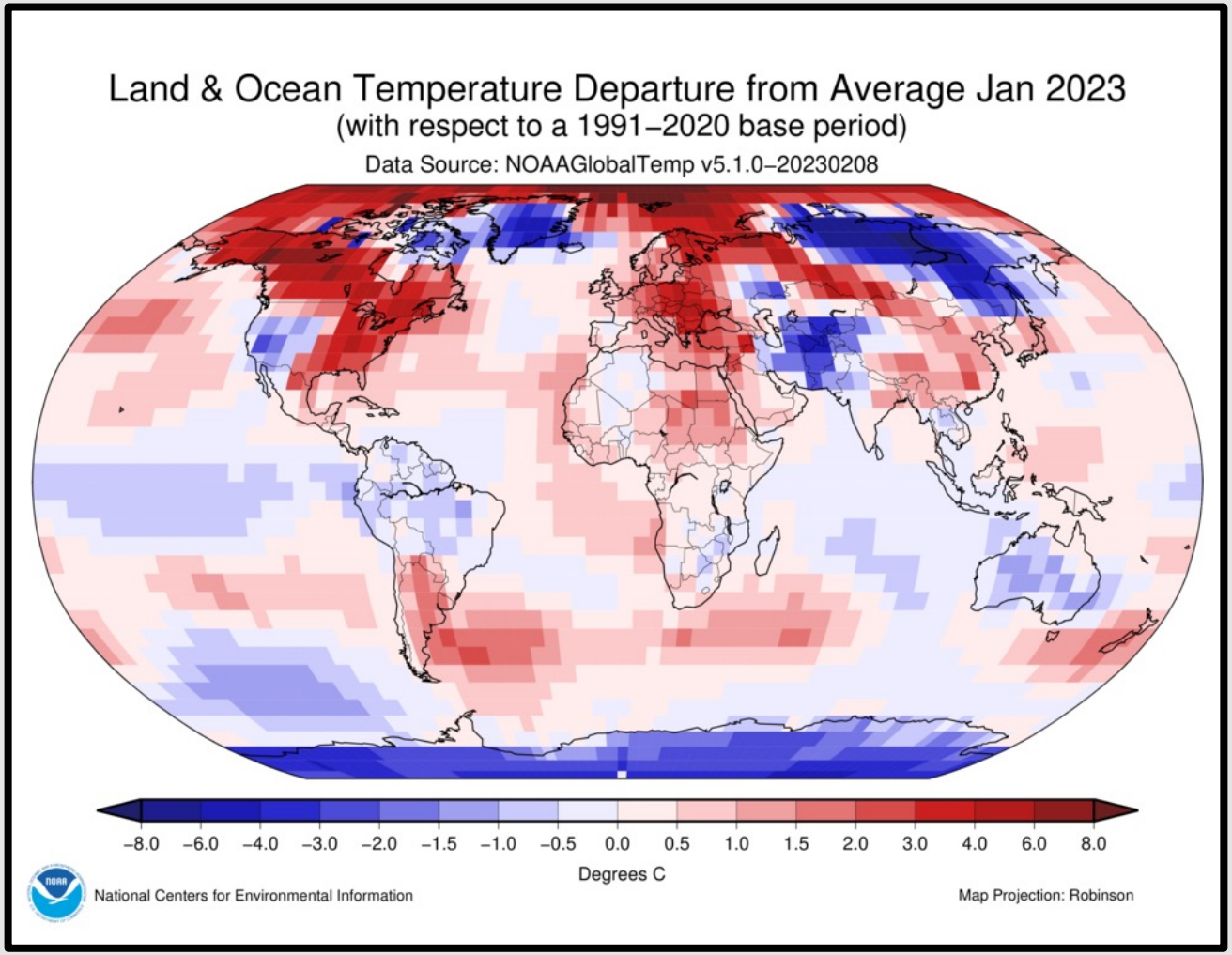
NASA: Long term trends, El Niño et al.

Greatest warming in Northern Hemisphere, on land, and in the Arctic



NOAA: The 2023 Story by Month

Things got hotter as the year went on



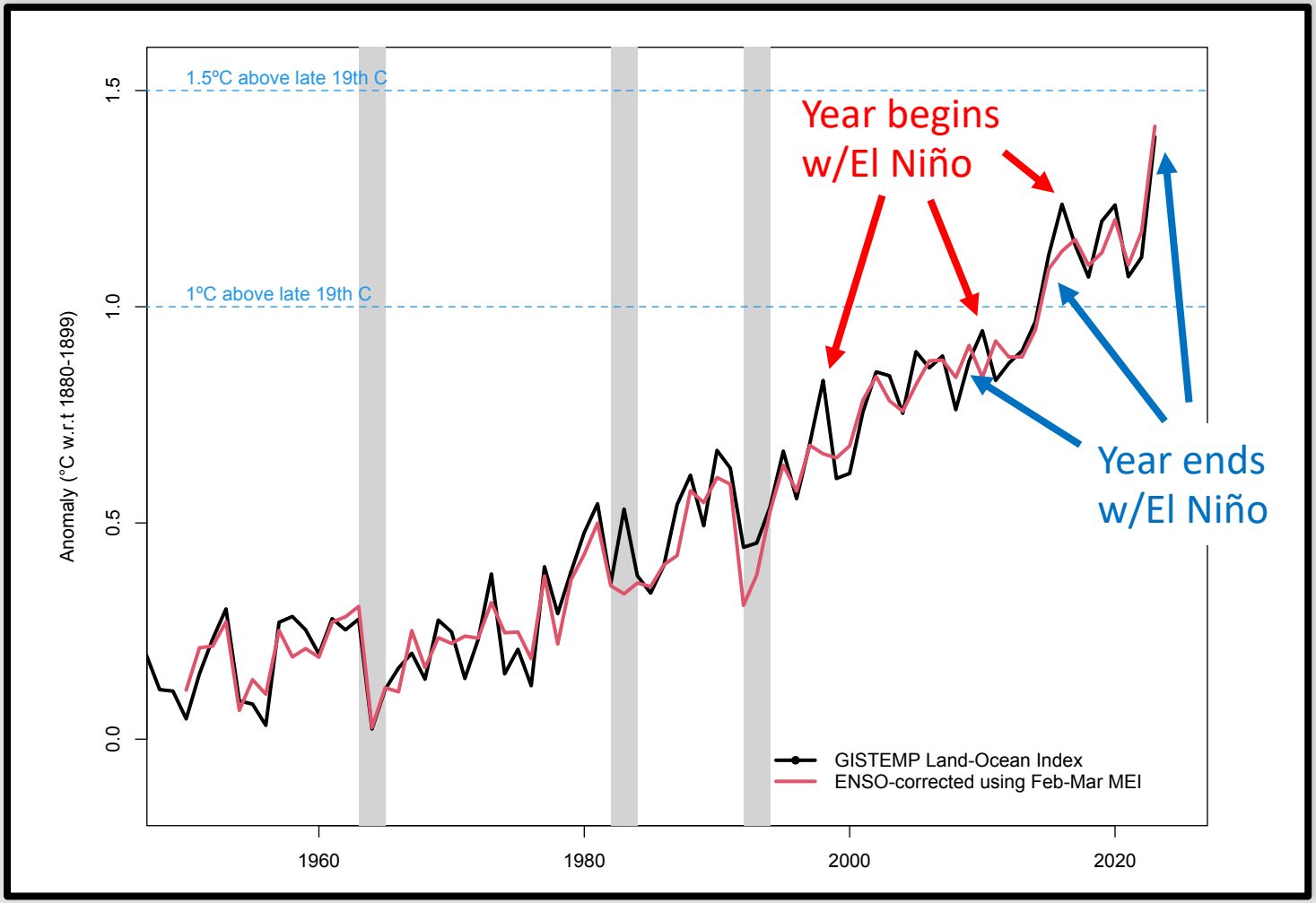
NASA: ENSO Impact on Global Temperature

Normal expectation was reversed in 2023!

From prior years, max correlation with annual global mean is Feb-Mar ENSO e.g.

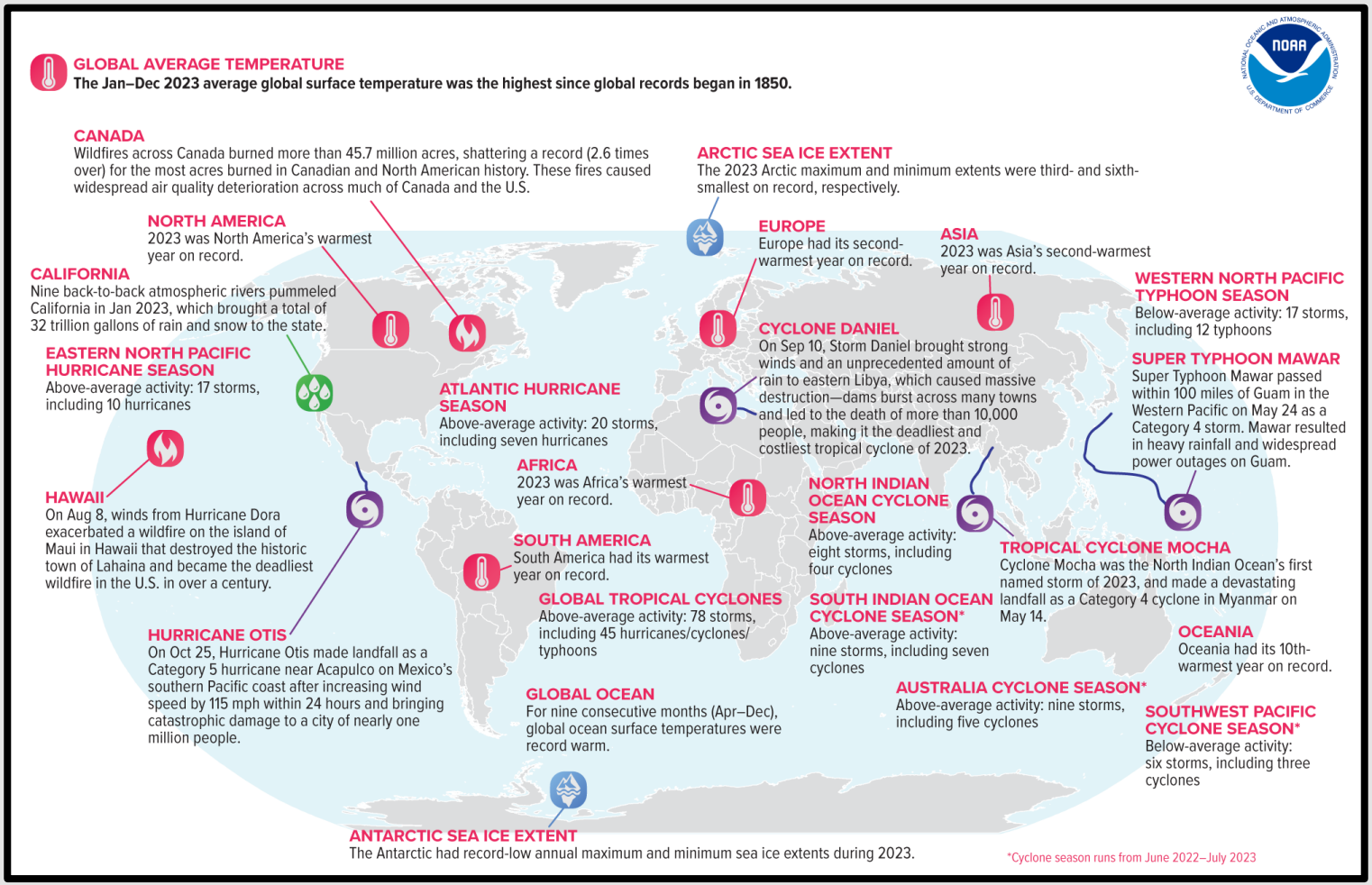
2016: 0.11°C
2021: -0.03°C
2022: -0.06°C

2023 had a mild La Niña (F/M) but developed El Niño after May.



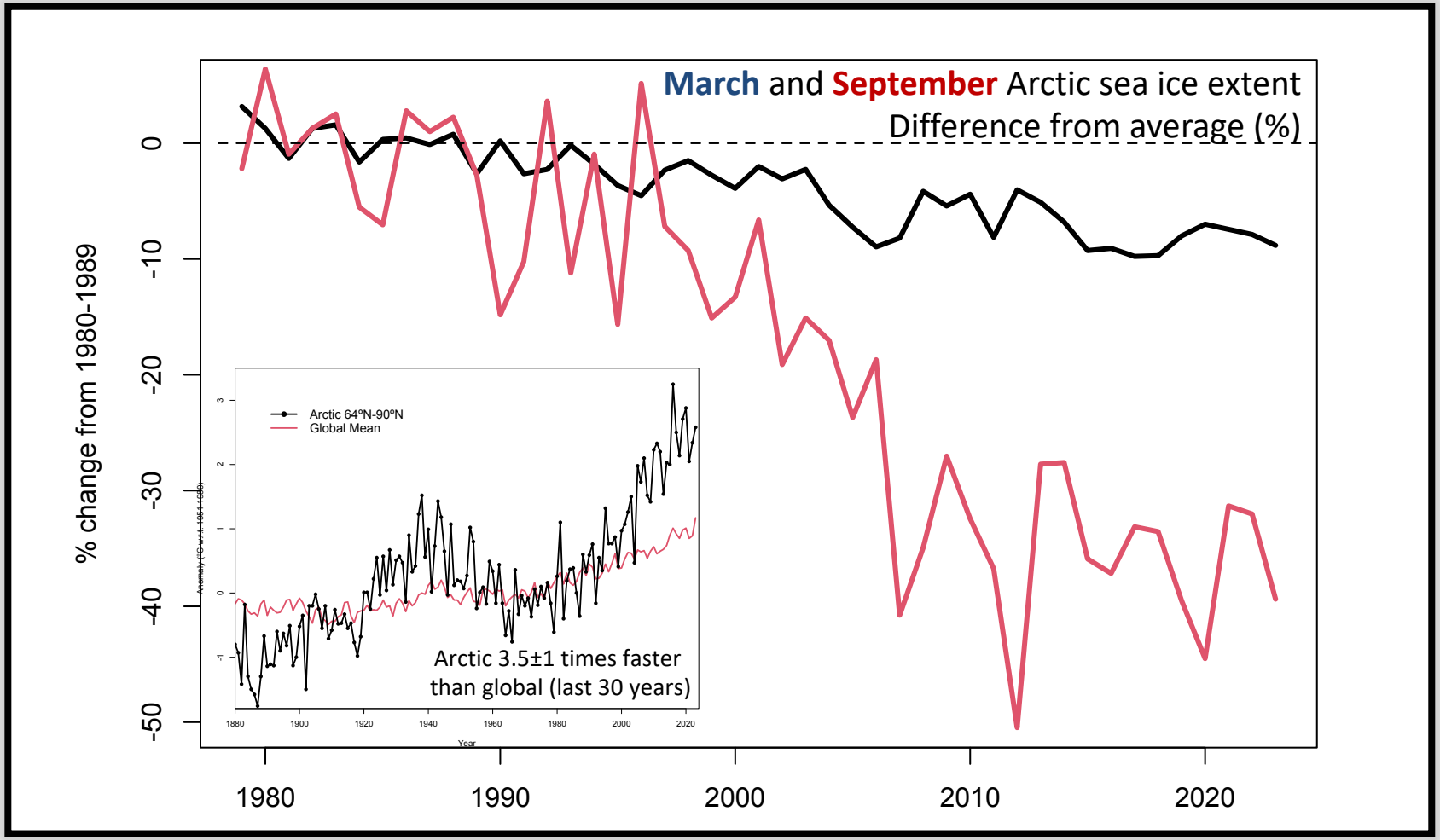
NOAA: Select Significant Events of 2023

Once again there was no shortage of material for this map



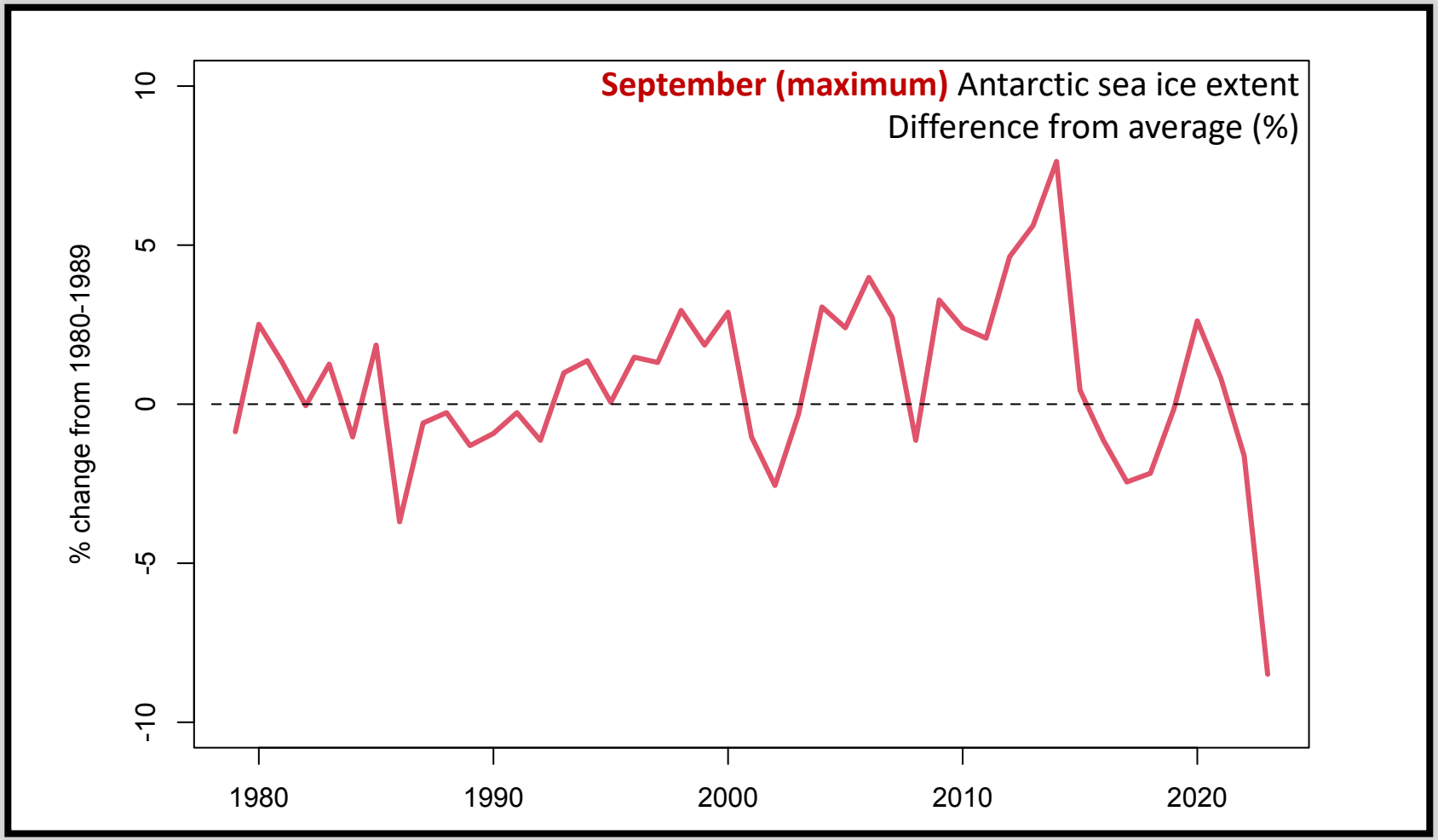
NASA: Arctic Sea Ice Declines

Arctic warming more than 3x faster than global mean



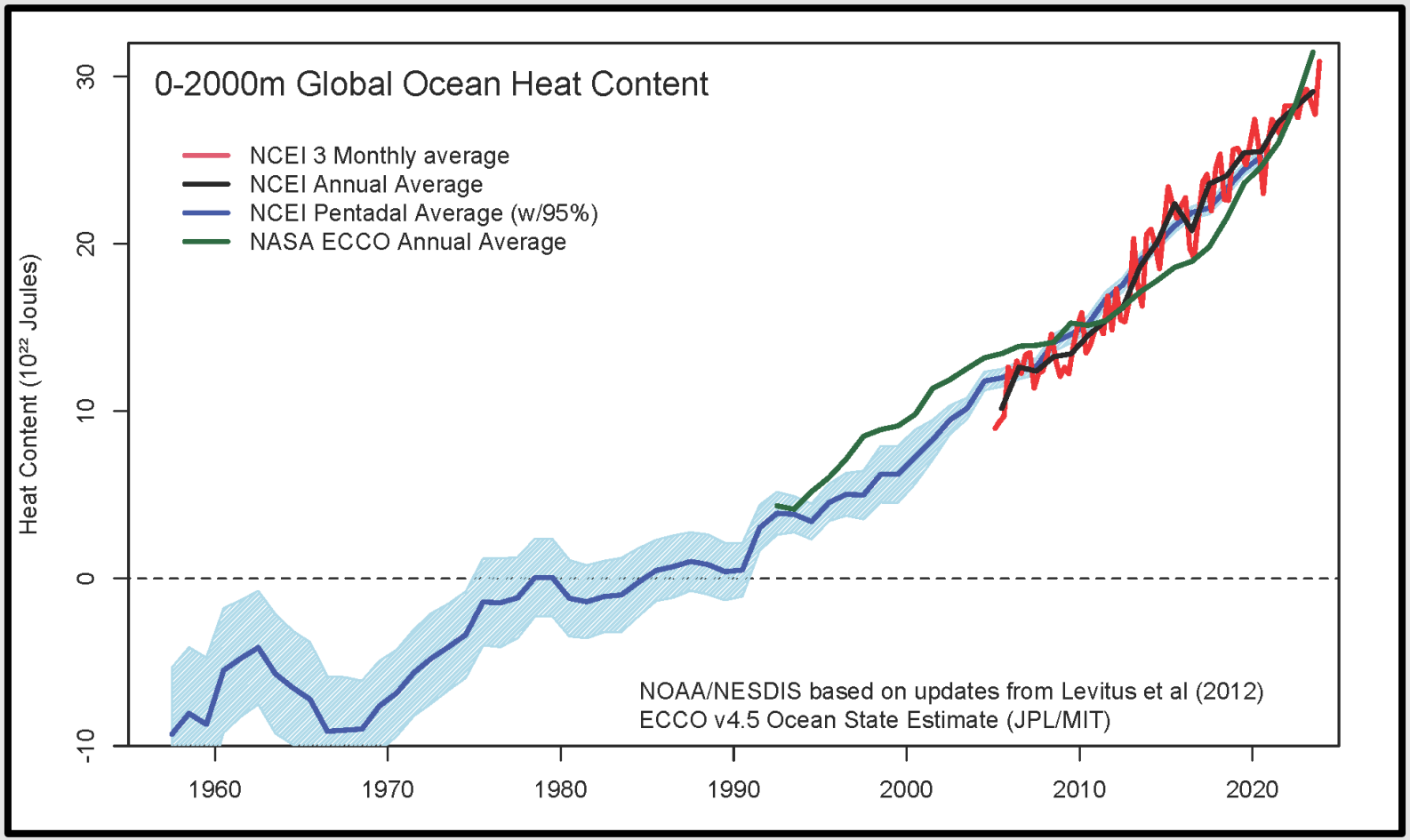
NASA: Antarctic Sea Ice Trends

Many years of slightly increasing extent, now record lows



NOAA: Record Ocean Heat Content

Oceans absorb more than 90% of the excess heat



NASA: Evaluation Against Reanalysis / Remote Sensing

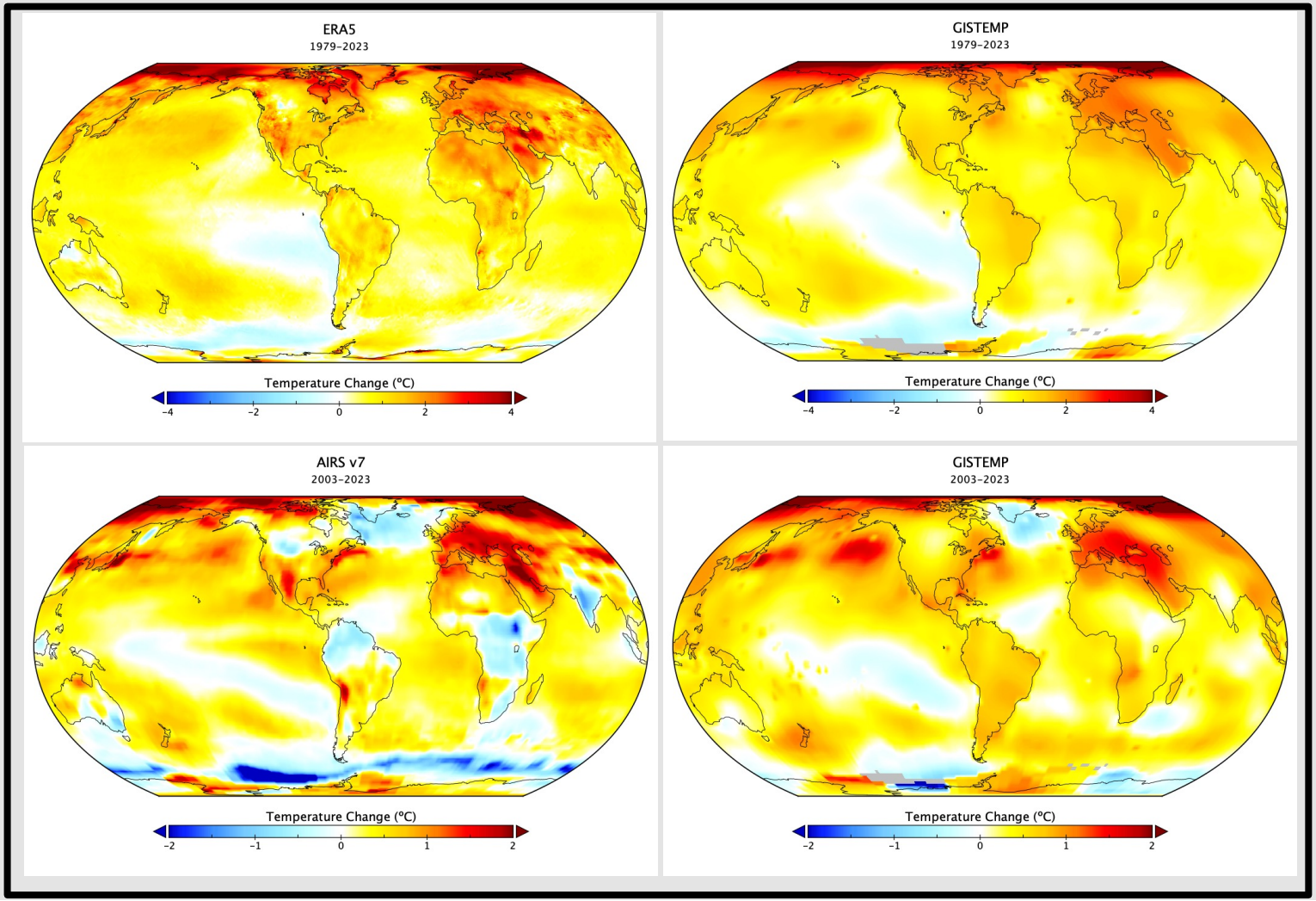
Independent data sets validate surface temperature analysis

ERA5 is the latest ECMWF reanalysis.

Trends 1979-2023:
- ERA5: 0.87 ± 0.11°C
- GISTEMP: 0.85°C
- NOAA: 0.82°C

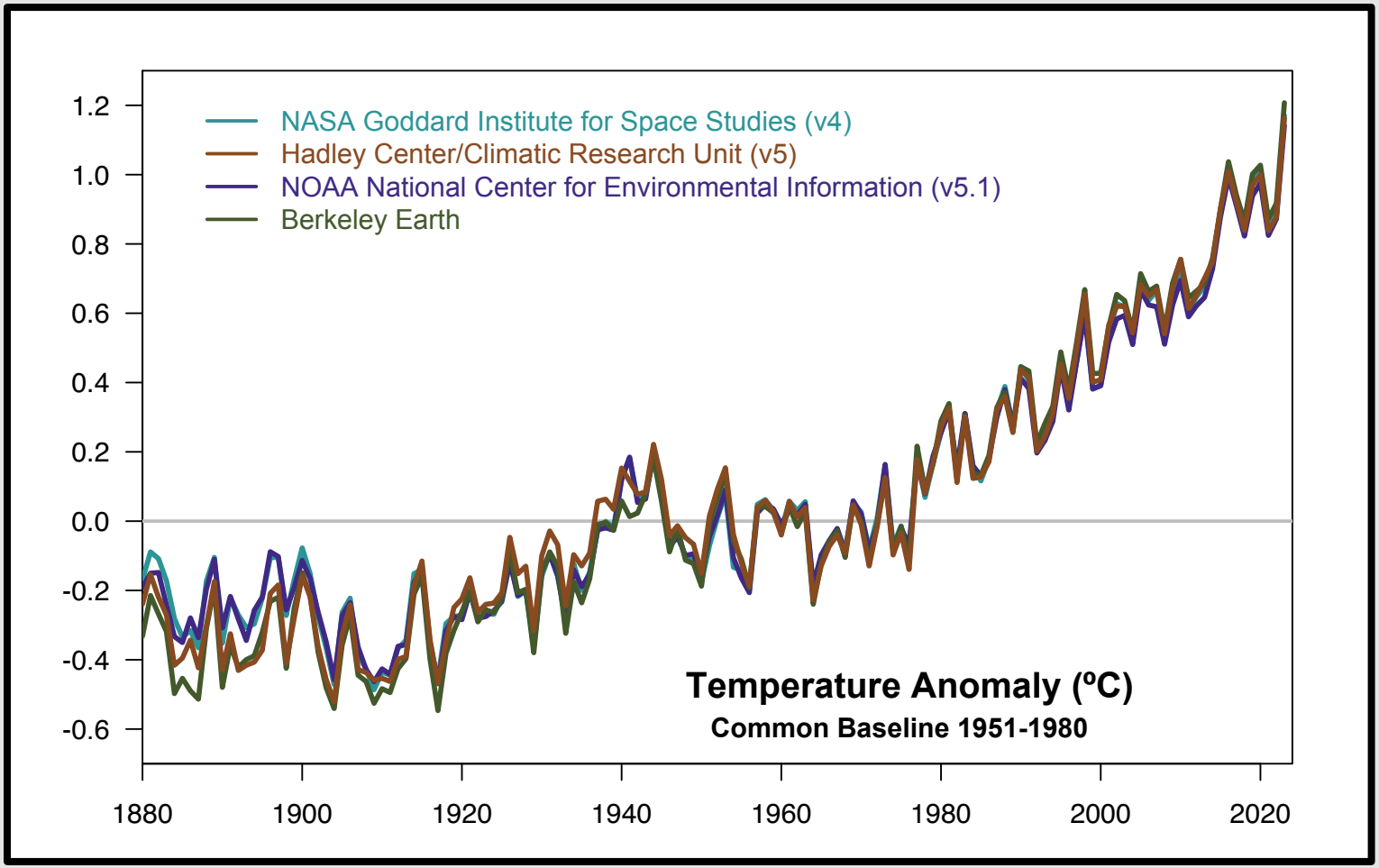
AIRS is an instrument on Eos Aqua.

Trends 2003-2023:
- AIRSv6: 0.38 ± 0.16°C
- AIRSv7: 0.34°C
- GISS: 0.48°C
- NOAA: 0.48°C
- ERA5: 0.52°C



NOAA: Analyses Track One Another

Despite Differences in Methodology



Questions?

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